Claims

1. A method for removing a layer from a substrate surface, comprising:

providing at least one encapsulating transport, the encapsulating transport containing at least some reactive gas;

applying the at least one encapsulating transport to the layer, the layer being a chemically reactive layer; and

wherein the encapsulating transport ruptures on the chemically reactive layer and releases the reactive gas onto the chemically reactive layer to facilitate removal of the layer from the substrate surface.

2. A method for removing a layer from a substrate surface as recited in claim 1, wherein releasing the chemically reactive gas onto the chemically reactive layer places a combination of the reactive gas and a reaction inducing agent in direct contact with the chemically reactive layer.

3. A method for removing a layer from a substrate surface as recited in claim 2, wherein the reaction inducing agent is one of water (H_2O), deionized water (DIW), water (H_2O) and a cleaning fluid, water (H_2O) and a surfactant, water (H_2O) and the cleaning fluid and the surfactant, deionized water (DIW) and the cleaning fluid, deionized water (DIW) and the surfactant, and the deionized water (DIW) and the cleaning fluid and the surfactant.

4. A method for removing a layer from a substrate surface as recited in claim 1, wherein the at least one encapsulating transport is combined with other encapsulating transports to define a foam.

5. A method for removing a layer from a substrate surface as recited in claim 1, wherein the at least one encapsulating transport is a bubble.

6. A method for removing a layer from a substrate surface as recited in claim 1, wherein the chemically reactive layer is an organic material.

7. A method for removing a layer from a substrate surface as recited in claim 1, wherein the reactive gas is one of ozone (O_3), oxygen (O_2), hydrochloric acid (HCl), hydrofluoric acid (HF), nitrogen (N_2), argon (Ar), ozone (O_3) and nitrogen (N_2), ozone (O_3) and argon (Ar), ozone (O_3) and oxygen (O_2) and nitrogen (N_2), ozone (O_3) and oxygen (O_2) and argon (Ar), ozone (O_3) and oxygen (O_2) and nitrogen (N_2) and argon (Ar), oxygen (O_2) and argon (Ar), oxygen (O_2) and nitrogen (N_2), and oxygen (O_2) and argon (Ar) and nitrogen (N_2).

8. A method for removing a layer from a substrate surface as recited in claim 2, further comprising,

generating the at least one encapsulating transport.

9. A method for removing a layer from a substrate surface as recited in claim 8, wherein the generating the at least one encapsulating transport further comprising,

providing the reactive gas;

providing the reaction inducing agent; and

mixing the reactive gas and the reaction inducing agent to generate the at least one encapsulating transport, the encapsulating transport containing at least some of the reactive gas.

10. A method for removing a layer from a substrate surface as recited in claim 8, wherein the generating the at least one encapsulating transport further comprising,

providing the reactive gas;

providing the reaction inducing agent; and

mixing under pressure the reactive gas and the reaction inducing agent to generate the at least one encapsulating transport, the encapsulating transport containing at least some of the reactive gas.

11. A method for removing a layer from a substrate surface as recited in claim 8, wherein the generating the at least one encapsulating transport further comprising,

providing the reactive gas;

providing the reaction inducing agent; and

supplying the reactive gas under pressure into the reaction inducing agent through a sparger to generate the at least one encapsulating transport, the encapsulating transport containing at least some of the reactive gas.

12. A method for removing a layer from a substrate surface as recited in claim 8, wherein the generating at least one encapsulating transport further comprising,

providing the reactive gas and the reaction inducing agent; and

agitating the reactive gas and the reaction inducing agent to generate the at least one encapsulating transport, the encapsulating transport containing the at least some of the reactive gas.

13. A method for removing a layer from a substrate surface, comprising:

providing a reactive gas;

providing a reaction inducing agent;

mixing the reactive gas and the reaction inducing agent to generate at least one encapsulating transport, the encapsulating transport containing at least some of the reactive gas; and

applying the at least one encapsulating transport to the layer, the layer being a chemically reactive layer;

wherein the encapsulating transport ruptures on the chemically reactive layer and releases the reactive gas onto the chemically reactive layer to facilitate removal of the layer from the substrate surface.

14. A method for removing a layer from a substrate surface as recited in claim 13, wherein releasing the chemically reactive gas onto the chemically reactive layer places a combination of the reactive gas and the reaction inducing agent in direct contact with the chemically reactive layer.

15. A method for removing a layer from a substrate surface as recited in claim 13, wherein the at least one encapsulating transport is combined with other encapsulating transports to define a foam.

16. A method for removing a layer from a substrate surface as recited in claim 13, wherein the at least one encapsulating transport is a bubble.

17. A method for removing a layer from a substrate surface as recited in claim 13, wherein the chemically reactive layer is an organic material.

18. A method for removing a layer from a substrate surface as recited in claim 13, wherein the reactive gas is one of ozone (O_3), oxygen (O_2), hydrochloric acid (HCl), hydrofluoric acid (HF), nitrogen (N_2), argon (Ar), ozone (O_3) and nitrogen (N_2),

ozone (O_3) and argon (Ar), ozone (O_3) and oxygen (O_2) and nitrogen (N_2), ozone (O_3) and oxygen (O_2) and argon (Ar), ozone (O_3) and oxygen (O_2) and nitrogen (N_2) and argon (Ar), oxygen (O_2) and argon (Ar), oxygen (O_2) and nitrogen (N_2), and oxygen (O_2) and argon (Ar) and nitrogen (N_2).

19. A method for removing a layer from a substrate surface as recited in claim 14, wherein the reaction inducing agent is one of water (H_2O), deionized water (DIW), water (H_2O) and a cleaning fluid, water (H_2O) and a surfactant, water (H_2O) and the cleaning fluid and the surfactant, deionized water (DIW) and the cleaning fluid, deionized water (DIW) and the surfactant, and the deionized water (DIW) and the cleaning fluid and the surfactant.

20. An apparatus for removing a layer from a substrate surface, comprising:

an application unit, the application unit configured to receive at least one encapsulating transport, the at least one encapsulating transport containing at least some reactive gas;

wherein the encapsulating transport is capable of being applied to the layer to cause a reaction between the layer and the reactive gas when the encapsulating transport ruptures on the layer.

21. An apparatus for removing a layer from a substrate surface as recited in claim 20, wherein the encapsulating transport is capable of being applied to the layer to

cause a reaction between the layer and a combination of the reactive gas and a reaction inducing agent when the encapsulating transport ruptures on the layer.

22. An apparatus for removing a layer from a substrate surface as recited in claim 21, wherein the reaction inducing agent is one of water (H_2O), deionized water (DIW), water (H_2O) and a cleaning fluid, water (H_2O) and a surfactant, water (H_2O) and the cleaning fluid and the surfactant, deionized water (DIW) and the cleaning fluid, deionized water (DIW) and the surfactant, and the deionized water (DIW) and the cleaning fluid and the surfactant.

23. An apparatus for removing a layer from a substrate surface as recited in claim 20, wherein the application unit is a container.

24. An apparatus for removing a layer from a substrate surface as recited in claim 20, wherein the application unit is a proximity head.

25. An apparatus for removing a layer from a substrate surface as recited in claim 20, further comprising, an encapsulating transport generating unit.

26. An apparatus for removing a layer from a substrate surface as recited in claim 20, wherein the reactive gas is one of ozone (O_3), oxygen (O_2), hydrochloric acid (HCl), hydrofluoric acid (HF), nitrogen (N_2), argon (Ar), ozone (O_3) and nitrogen (N_2),

ozone (O_3) and argon (Ar), ozone (O_3) and oxygen (O_2) and nitrogen (N_2), ozone (O_3) and oxygen (O_2) and argon (Ar), ozone (O_3) and oxygen (O_2) and nitrogen (N_2) and argon (Ar), oxygen (O_2) and argon (Ar), oxygen (O_2) and nitrogen (N_2), and oxygen (O_2) and argon (Ar) and nitrogen (N_2).

27. An apparatus for removing a layer from a substrate surface as recited in claim 20, wherein the layer is an organic material.

28. An apparatus for removing a layer from a substrate surface as recited in claim 20, wherein the at least one encapsulating transport is combined with other encapsulating transports to define a foam.

29. An apparatus for removing a layer from a substrate surface as recited in claim 20, wherein the at least one encapsulating transport is a bubble.

30. An apparatus for removing a layer from a substrate surface, comprising:

a reactive gas source;

a reaction inducing agent source; and

an application unit, the application unit configured to receive a combination of the reactive gas obtained from the reactive gas source and the reaction inducing agent obtained from the reaction inducing agent source to produce at least one encapsulating

transport, the at least one encapsulating transport containing at least some of the reactive gas;

wherein the encapsulating transport is capable of being applied to the layer to cause a reaction between the layer and the reactive gas when the encapsulating transport ruptures on the layer.

31. An apparatus for removing a layer from a substrate surface as recited in claim 30, wherein the encapsulating transport is capable of being applied to the layer to cause a reaction between the layer and a combination of the reactive gas and the reaction inducing agent when the encapsulating transport ruptures on the layer.

32. An apparatus for removing a layer from a substrate surface as recited in claim 31, wherein the reaction inducing agent is one of water (H_2O), deionized water (DIW), water (H_2O) and a cleaning fluid, water (H_2O) and a surfactant, water (H_2O) and the cleaning fluid and the surfactant, deionized water (DIW) and the cleaning fluid, deionized water (DIW) and the surfactant, and the deionized water (DIW) and the cleaning fluid and the surfactant.

33. An apparatus for removing a layer from a substrate surface as recited in claim 30, wherein the application unit is a proximity head.

34. An apparatus for removing a layer from a substrate surface as recited in claim 30, wherein the reactive gas is one of ozone (O_3), oxygen (O_2), hydrochloric acid (HCl), hydrofluoric acid (HF), nitrogen (N_2), argon (Ar), ozone (O_3) and nitrogen (N_2), ozone (O_3) and argon (Ar), ozone (O_3) and oxygen (O_2) and nitrogen (N_2), ozone (O_3) and oxygen (O_2) and argon (Ar), ozone (O_3) and oxygen (O_2) and nitrogen (N_2) and argon (Ar), oxygen (O_2) and argon (Ar), oxygen (O_2) and nitrogen (N_2), and oxygen (O_2) and argon (Ar) and nitrogen (N_2).

35. An apparatus for removing a layer from a substrate surface as recited in claim 30, wherein the layer is an organic material.

36. An apparatus for removing a layer from a substrate surface as recited in claim 30, wherein the at least one encapsulating transport is combined with other encapsulating transports to define a foam.

37. An apparatus for removing a layer from a substrate surface as recited in claim 30, wherein the at least one encapsulating transport is a bubble.